

CLAIMS

What is claimed is:

1. An impactor, for producing an in situ dental restoration, comprising:
 - a handle connected to a head;
 - said head including a housing, an end cap, and a solenoid disposed between said housing and said end cap, said solenoid for driving a hammer in a downward direction into an anvil upon activation of said solenoid;
 - said anvil having an anvil tip for impacting paste in a cavity of a patient's tooth when driven downward;
 - a source of dental restoration paste; and
 - a paste feeder tube, coupled to said source of dental restoration paste, for directing the dental restoration paste from the source of dental restoration paste to a location proximate the anvil tip.
2. The impactor for producing an in situ dental restoration according to claim 1, wherein said source of dental restoration paste includes a disposable paste cartridge.
3. The impactor for producing an in situ dental restoration according to claim 2, further including a paste

feeder, for forcing the paste from the paste cartridge through the paste feeder tube to proximate the anvil tip.

4. The impactor for producing an in situ dental restoration according to claim 3, wherein the paste feeder for forcing the paste from the paste cartridge through the paste feeder tube to the anvil tip is a pneumatic paste feeder.

5. The impactor for producing an in situ dental restoration according to claim 3, wherein the paste feeder for forcing the paste from the paste cartridge through the paste feeder tube to the anvil tip is a mechanical paste feeder.

6. The impactor for producing an in situ dental restoration according to claim 5, wherein the mechanical feeder includes a piston for displacing a controlled amount of paste to the cavity of the patient's tooth.

7. The impactor for producing an in situ dental restoration according to claim 2, wherein said anvil is disposed at an angle relative to a long portion of said handle, and wherein said angle is between approximately 90 degrees and approximately 105 degrees.

8. The impactor for producing an in situ dental restoration according to claim 1, wherein the hammer is "T" shaped, said hammer having a horizontal portion and a vertical portion, said horizontal portion extending above a top surface of the solenoid and below the end cap, and said vertical portion extending through a slot in the solenoid and in contact with the anvil.

9. The impactor for producing an in situ dental restoration according to claim 8, further including a bearing sleeve on an inside surface of the slot, for receiving the vertical portion of the hammer.

10. The impactor for producing an in situ dental restoration according to claim 9, further including a solenoid power supply for providing a pulse current to the solenoid, and wherein said solenoid receives the pulse current when the horizontal portion of the hammer is at its furthest distance from the top surface of the solenoid, thereby driving the vertical portion of the hammer downward into the anvil.

11. The impactor for producing an in situ dental restoration according to claim 10, wherein the hammer rebounds upward from the impact with the anvil.

12. The impactor for producing an in situ dental restoration according to claim 11, wherein the top surface of the solenoid stops the hammer in its downward movement and the end cap stops the hammer in its upward movement.

13. The impactor for producing an in situ dental restoration according to claim 1, wherein the anvil tip is flat.

14. The impactor for producing an in situ dental restoration according to claim 1, wherein the anvil tip is serrated.

15. The impactor for producing an in situ dental restoration according to claim 8, wherein the horizontal portion of said hammer is made from a hard steel and having a lower surface to which is bonded a disc made of a soft magnetic material.

16. The impactor for producing an in situ dental restoration according to claim 1, wherein the anvil extends from a bottom surface of the solenoid, and wherein said anvil is made from 2.5% silicon soft magnetic annealed iron.

17. The impactor for producing an in situ dental restoration according to claim 1, wherein the paste comprises a material selected from the group consisting of silver, silver alloys, gold, and gold alloy powder in paste form to which is added 2% HBF₄.

18. The impactor of claim 1 wherein the solenoid is replaced by a transducer selected from the group consisting of an electrostatic transducer, a magnetostrictive transducer, a pneumatic transducer an electric motor and an hydraulic drive.

19. The impactor for producing an in situ dental restoration according to claim 17, further including a vacuum system for removing liquids, semi-liquids, and solids from the cavity.

20. A process for making an *in situ* restoration with an impactor, the process comprising the acts of:
dispensing restoration paste into a dental cavity;
activating a solenoid such that a hammer is forced downward into an anvil;
compacting the restoration paste dispensed in said cavity with an anvil tip of the anvil; and
repeating said dispensing, activating, and compacting acts until the cavity is filled.

21. A solenoid driven impactor, comprising:

a solenoid disposed in a housing having a top, said solenoid for driving a hammer in a downward direction into an anvil upon activation of said solenoid, said anvil having an anvil tip for impacting a surface;

a "T" shaped hammer, said hammer having a horizontal portion and a vertical portion, said horizontal portion disposed above a top surface of said solenoid, and said vertical portion extending through a slot in the solenoid and in contact with said anvil;

a solenoid power supply, for providing a pulse current to activate the solenoid, and wherein said solenoid receives the pulse current when the horizontal portion of the hammer is at its furthest distance from the top surface of the solenoid, thereby driving the vertical portion of the hammer downward into the anvil; and

wherein the hammer rebounds upward from the impact with the anvil, and wherein the top surface of the solenoid stops the hammer in its downward movement and the housing top stops the hammer in its upward movement.

22. A transducer driven impactor, comprising:

a transducer, disposed in a housing having a top, said transducer for driving a hammer in a downward direction into an anvil upon activation of said transducer, said anvil having an anvil tip for impacting a surface;

a "T" shaped hammer, said hammer having a horizontal portion and a vertical portion, said horizontal portion disposed above a top surface of said transducer, and said vertical portion extending through a slot in the transducer and in contact with said anvil;

a transducer power supply, for providing a pulse current to activate the transducer, and wherein said transducer receives the pulse current when the horizontal portion of the hammer is at its furthest distance from the top surface of the transducer, thereby driving the vertical portion of the hammer downward into the anvil; and

wherein the hammer rebounds upward from the impact with the anvil, and wherein the top surface of the transducer stops the hammer in its downward movement and the housing top stops the hammer in its upward movement.

23. An impactor for producing an in situ dental restoration, comprising:

a handle connected to a head;

said head including a housing, an end cap, and a transducer disposed between said housing and said end cap, said transducer for driving a hammer in a downward direction into an anvil upon activation of said transducer;

said anvil having an anvil tip for impacting paste in a cavity of a patient's tooth when driven downward;

a source of dental restoration paste; and

a paste feeder, coupled to said source of dental restoration paste, for directing the dental restoration paste from the source of dental restoration paste to a location proximate said in a cavity of a patient's tooth.

24. The impactor for producing an in situ dental restoration according to claim 23, wherein the transducer is selected from the group consisting of an electrostatic transducer, an electric motor, and a hydraulic drive.

25. A pneumatic paste feeder for moving paste, comprising:
a paste source for holding paste;
a paste feeder tube operatively connected between the paste
source and a dispensing tip; and
a pneumatic supply source for moving the paste from the
paste source to the dispensing tip.

26. A mechanical paste feeder for moving and preliminarily condensing paste prior to impaction, comprising:

a paste source for holding paste;

a paste feeder tube, operatively connected between the paste source and a dispensing tip;

a paste channel, located between the paste source and the paste feeder tube and defining a cavity and for holding the paste; and

a spring, located in the cavity of the paste channel and operatively connected to a plunger, for moving the paste from the paste channel to the dispensing tip in controlled amounts through the paste feeder tube.

27. A mechanical paste feeder for moving paste,
comprising:

a paste source for holding paste;
a paste feeder tube operatively connected between the paste
source and a dispensing tip;
a paste channel, located between the paste source and the
paste feeder tube and defining a cavity and for holding the
paste; and
a constant displacement apparatus, coupled to the paste
channel and the paste feeder tube, for moving the paste from the
paste channel to the dispensing tip via the paste feeder tube in
controlled, preselected amounts.